

day, it went a little above 2 feet 4 inches; to-day, however, it has fallen three or four lines. I have a tube which remains fastened day and night in the same spot, in order to make these observations. I think, however, that it will be better not to publish these latter at present but to wait until Pascal's book has come out.

I wish also that you would try to light a fire in your vacuum, and that you would observe whether the smoke goes up or down, and what shape the flame has. One can make this experiment by putting a little sulphur or campher at the end of a thread in the vacuum,* and then setting it on fire through the glass by means of a mirror or burning glass. I cannot make this experiment here because the sun is not warm enough, and I have not yet been able to get the tube adjusted with the bottle. [i. e. the vacuum bulb.—C. A.] I am astonished that you have kept this experiment, as Pascal says, to yourself for four years without having ever said a word to me about it, and that you should not have begun to try it before this present summer, for as soon as you mentioned it to me I judged that it was a matter of importance, and that it might be of great service in verifying what I have written on physics.

COMMENTS ON THE PRECEDING LETTER.

By G. MONCHAMP.

Such is this "lost" letter of Descartes so interesting in the history of science, and wherein he reveals so clearly his own character, his relations with Pascal, his desire to be kept informed of all the novelties in science, and, what is still more remarkable, his fear of announcing *a priori* ideas that might be contradicted by experiment, or, if confirmed, his fear of being suspected of having predicted them after having first tried them experimentally.

We remark also that Descartes states that he had recommended Pascal to determine by experiment whether the mercury rose as high when on the top of a mountain as when at the bottom. Pascal, at the time when Descartes wrote to him about making this observation, had not yet done so, but, on the 15th of November, 1647, he had asked his brother-in-law, Périer, to try it at Clermont. We see here that Descartes claims the idea of this experiment as his own, at least he states that he suggested it to Pascal. The latter had pretended that the idea came spontaneously from himself. This letter from Descartes, added to other documents, proves that Pascal was mistaken.

According to the obvious meaning of the letter above given, it would seem clear that on December 13, 1647, Descartes not only did not know that Pascal had written to his brother-in-law requesting him to make the experiment on Puy-de-Dôme, but he did not even know that he had any intention of so doing. On the other hand Pascal, in the text which he himself gives of the letter of November 16, 1647, to his brother-in-law, states very clearly that Father Mersenne had communicated this intention to Descartes. He says:

Upon this assurance (that you will oblige me by making this experiment on the Puy-de-Dôme yourself) I have led all our friends in Paris to look forward to it, and among others *Father Mersenne who has already pledged himself by letters that he has written on this subject to Italy, Poland, Switzerland, Holland, etc., to inform the friends whom he has made in those countries.*

We see also by this "unpublished" letter that Descartes was the first to add a graduated scale to the barometer and to undertake regular observations with it.

Pascal seems not to have known about the variations in height of the mercurial column, when kept in the same locality, until after the publication of the experiment on Puy-de-Dôme (which took place September 19, 1648). He did not communicate anything about it to Périer until shortly after that time, as stated by the latter:

After I had made the experiment on the Puy-de-Dôme, as above related, Mr. Pascal wrote me from Paris to Clermont where I then was, that not only the change of location (that is to say of altitude) but also the changes of weather at the same place, according as it is more or less cold or warm, wet or dry, causes different elevations and depressions of the mercury in the tube.

* The vacuum chamber was apparently a large bulb blown at the upper end of the barometer tube.

Périer afterward says that he began making regular observations, that he compared them with others made in distant places at the same time, etc. In a word, he speaks and acts in the manner indicated by Descartes, as is shown by our letter and by other letters that have been recently discovered.

We know that on the death of Mersenne (September 1, 1648,) Roberval, the friend of Pascal, seized upon the letters from Descartes to Mersenne which were found in the cell of this monk.

The letter of Descartes on the barometer seems to have been afterward passed from one person to another, for M. Tannery has, it seems to us, demonstrated that it was not revised by Lahire, who had, however, come into possession of those letters left by Roberval in 1675, the year of his death.

In a word, we are led to believe that Pascal in this present case also profited by Descartes.

Finally we will recall that at the beginning of his little pamphlet, Pascal says:

It is now about four years since the glass tube was first tried in Italy. * * * This account of the experiment having been sent from Rome to Father Mersenne, a monk in Paris, he published it in France in 1644, to the great admiration of all the scientists.

This sentence explains the astonishment expressed by Descartes when he says to Father Mersenne, toward the end of his letter:

I am astonished that you have, as Pascal says, kept this experiment to yourself for four years without having said a word to me about it, and without having begun to try it until this summer.

This omission on the part of Mersenne, who was ordinarily very communicative, is partly explained by the failure of the attempts made by him to renew the experiment of Torricelli. Pascal wrote to M. de Ribeyre on this subject as follows:

Father Mersenne tried to repeat it in Paris, and not having made a complete success, stopped it and thought no more of it. Afterwards, going to Rome on some other business, he found out exactly how to do it, and returned with full instructions. The news of this having reached us, in 1646, at Rouen, where I was at the time, we made this Italian experiment following the memoir of Father Mersenne.

These two accounts by Pascal do not entirely agree, and neither of the two contains the exact truth.

Mersenne returned from Italy in July, 1645, tried the experiment again with M. Chanut, and they both tried to reproduce the phenomena, but again failed. Mersenne then had recourse to Petit in September, 1646, and this time he was successful. (*See Adam, "Pascal and Descartes."*)

It is, nevertheless, astonishing that Father Mersenne should have waited almost a year longer without informing Descartes of the great scientific news which had come from Italy. Could Mersenne have positively concealed from Descartes his experiment of 1646?

The manuscript of the letter which we have reproduced seems to have been lost. Notwithstanding the searches recently undertaken, it had not yet been found in 1898, and we do not know that it has been since.

"TULE FOG."

In our search for local meteorological terms not widely known, but sometimes worthy of broader usage, we have come upon the expression "tule fog" as used by Mr. McAdie in a recent number of the Report of the California Section.

According to the botanical dictionary "tule" is a species of bulrush occupying large areas of swamp and overflowed bottom lands in California. Of course, therefore, we infer that "tule fog" is meteorologically equivalent to fogs over marshes and swamps, or the fogs of the lowlands and the valleys. It is essentially due to the cooling by radiation during clear nights. At first the vegetation cools by its own radiation; then the adjacent air cools by contact with the